

# Panel Session: Approaches to Energy Re-Use



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# Panel Session Background

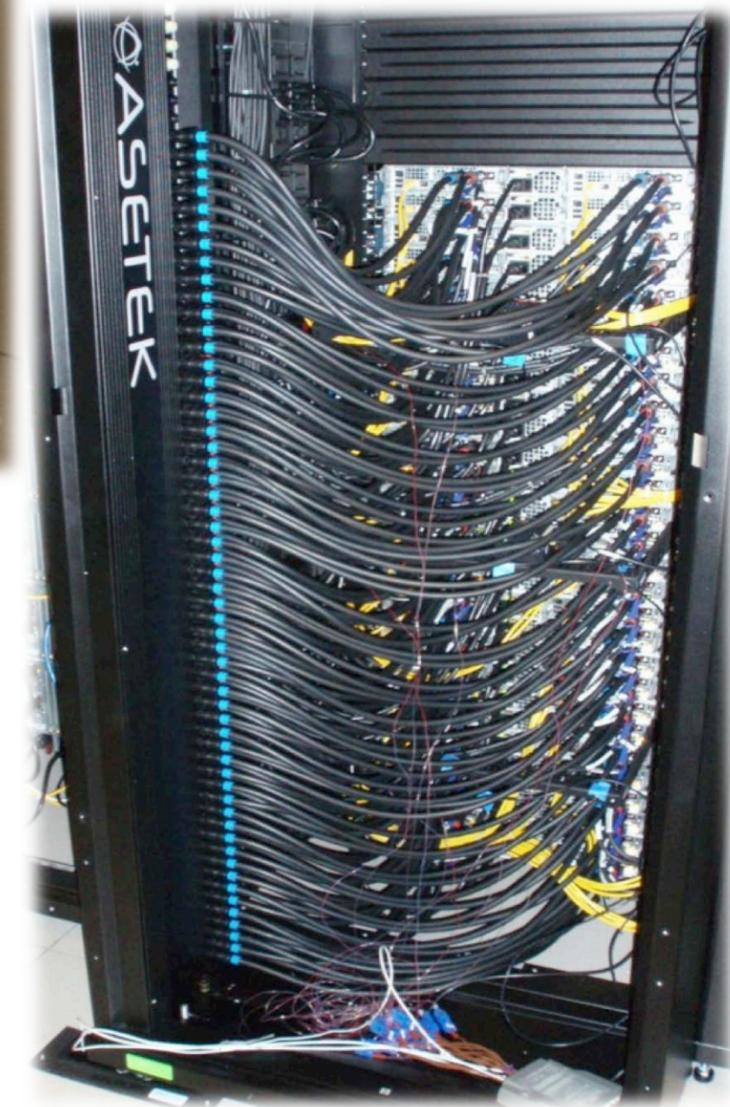
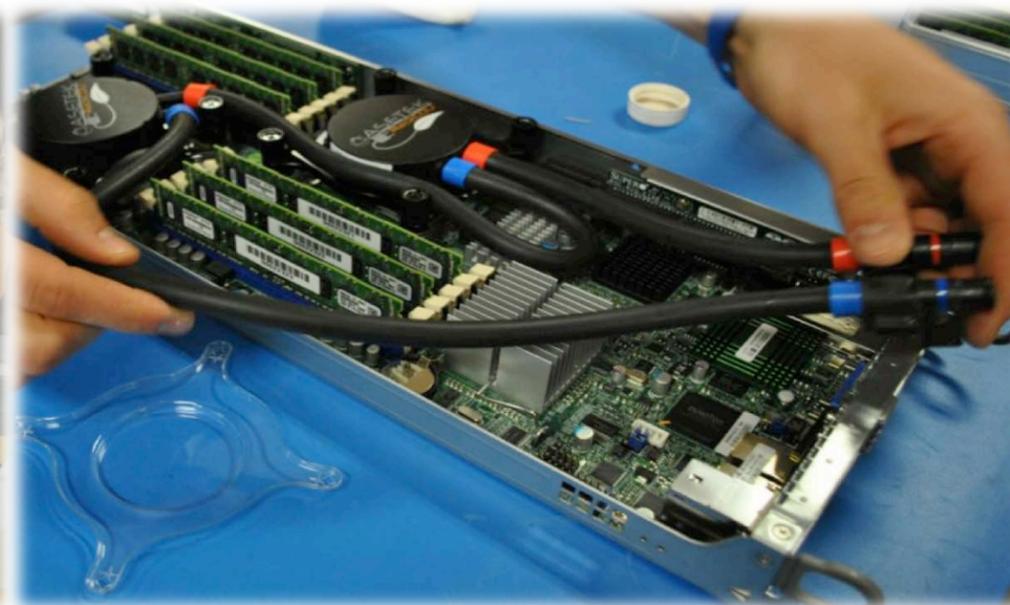
- Newer area of interest for most, not so new for others...
- Common principles, Opportunities are site dependent.
- Challenges may be greater in existing facilities vs new ones.

# Heat Re-use has two requirements:



Supply: Capture heat & Demand: Place to use it.

# CRADA with Asetek & Aspen Systems



- Retrofit existing compute rack with Asetek RackCDU
  - Skynet cluster, compute rack:
    - 14 2U Twin<sup>2</sup> Supermicro servers, 112x Intel Westmere X5667
    - Rack power under full load around 14.5 kW
  - Running typical 50% load, 48% energy recovered
  - Return water leaving at 38C
  - Opportunities identified to improve performance by reducing fan energy and thermal losses

# New HPC system

- New Install from HP
  - Peregrine HPC system, compute rack:
    - 144 dual socket IVB nodes
    - Rack power under full load around 53 kW
  - Active in row CDU.
    - Separates building primary cooling from specific needs of the IT equipment.
    - Manages flow rates to provide return water at prescribed temperature, largely independent of rack work load.
  - Captures +95% of IT rack heat load.
  - Return water between 35C and 43C.
    - Currently returning 40C.



# Energy Re-use requires an Integrated System Approach



## DATA CENTER

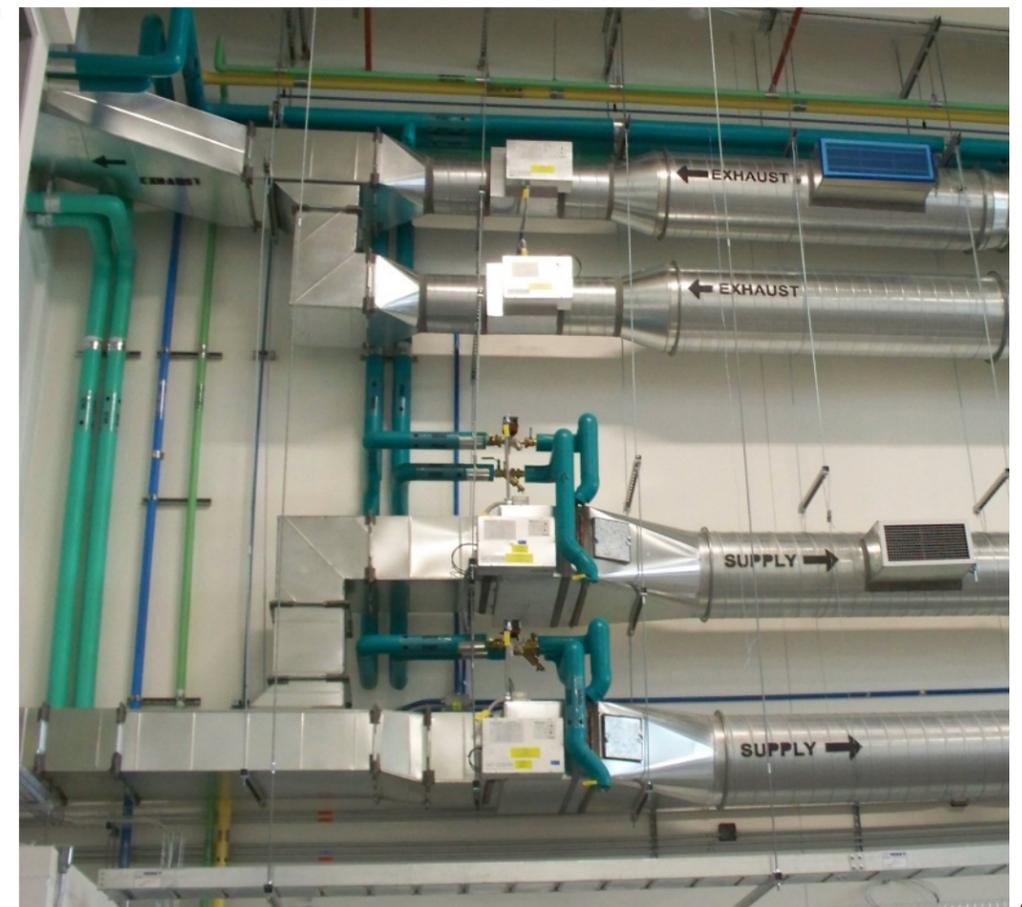
- Want bytes and BTUs
- Even 1 MW of IT load, provide ample heat
  - Heating 20,000m<sup>2</sup> building
- Critical to get heat into usable medium.
- Maximize Direct Heat to Water, Minimize Use of Air for Cooling

## MUTUALLY BENEFICIAL RELATIONSHIP

## OFFICE SPACE and

## HIGH BAY LABORATORIES

- Requires Large Volumes of Ventilation Air (Outside Air)
- Achieving Energy Re-Use Goals Requires:
  - Minimize Operational Energy Use
  - Maximize Energy Recovery Options
  - Explore “devices” and systems targeting low grade heat 40C
- Challenge:
  - Existing systems largely geared to hot water supply 60C



# Energy Recovery

Two highly efficient fan walls



Plate frame heat exchange



# Energy Use

Active Radiant (Chilled) Beams – Office Cooling & Heating

